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THE LICHENS OF MT. ROSE, NEVADA

ALBERT W. C. T. HERRE

Mt. Rose, with an altitude of 10,800 ft., is the highest peak in the region about Lake Tahoe, and lies about 15 miles southwest of Reno, Nev. A forest of *Pinus ponderosa* extends from the base of the peak at an approximate elevation of 6000 ft. to perhaps 8000 ft. The higher elevations on to the timber line, which is at an altitude of about 10,000 ft., are covered more or less by *Tsuga mertensiana*, *Libocedrus decurrens*, and *Pinus monticola*. During the Comstock boom this timber was greatly depleted, parts being deforested even up to the timber line. Along the water courses are scattered *Salix* sp., *Amelanchier* sp., and various smaller shrubs. Above 8000 ft. a large part of the mountain, in common with all the ranges about, is bare of trees and strewn with bowlders or plentifully sprinkled with dikes and outcrops of rock.

The remarkably original and valuable observations of Dr. J. E. CHURCH, of the University of Nevada, have furnished us with our knowledge of the climatology of Mt. Rose. For a number of years he has maintained on this isolated and well-nigh inaccessible peak a meteorological station unique in America. For a large part of the year snow lies upon the upper part of the peak, while at no time of the year is it entirely absent except where the winds keep the rock ledges swept bare. Snow may fall in quantity at any time of the year, though in late summer it nearly disappears, and when fresh-fallen lies but a short time. In the forested portion of the higher altitudes the snow forms great mounds which act as storage tanks, supplying water gradually to the lower levels. The summit temperatures are not excessively low, though of course cold weather prevails much of the time; −10° F. is the lowest recorded, but freezing weather occurs at any time of the year.

The most noticeable features of the lichen flora of the mountain are, so far as my observations extend, the utter absence of bark-dwelling species or those of dead or decorticated wood, and the equally conspicuous absence of earth lichens.

In part, at least, the absence of corticolous lichens is due directly to the winds of enormous velocity which are prevalent in this region. Gales of 50 miles an hour are frequent, while at times the inordinate velocity of 150 to 170 miles an hour is reached. As these winds sweep the mountain slopes, they carry sand or dust, sleet, and fine hard snow; the abrasive action of this flying material affects the bark of the conifers upon which it impinges in such a way that they appear as if freshly sandpapered. I was unable to find any indication of either lichens or mosses upon the bark of any tree or shrub examined.

The dearth of earth lichens may be in part explained by other causes, such as excessive dryness, the erosive action of floods caused by the rapid melting of snow when the Chinook winds blow in early spring, etc. But as yet I cannot understand the failure to find any trace of such genera as *Cladonia*, *Stereocaulon*, *Solorina*, *Cetraria*, and similar genera containing species characteristic of alpine situations. Perhaps prolonged search in early summer just after the disappearance of the greater part of the snow would reveal some of them.

The conditions noted above offer no hindrance to the growth of rock lichens. In the wooded slopes lichens occur on all rocks, but not abundantly, even where not shaded by the pines. But at 8000 ft. one comes suddenly into a region where lichens are both extraordinarily numerous and remarkably conspicuous. From here to the summit the dominant species is *Gyrophora reticulata*, which is excessively abundant; but the great bowlders strewing the mountain side and obstructing the trail are also spotted and blotched with huge, brilliant masses of *Acarospora chlorophana*, while *Caloplaca elegans* lends a gleam of fire to the somber landscape. The number of species occurring from here to the summit is very small, but this is amply compensated for by the number of individuals found in what one may term the *Gyrophora reticulata* formation. The species collected were as follows:

1. *Staurothele umbrina* (Ach.) Tuck.—Forming dark stains on rocks along the summit.

2. *Lecidea atrobrunnea* (Ram.) Schaer.—Abundant on all kinds of rocks at 8000 ft. and above; exceedingly variable, and perhaps

I have included more than one species, but as the more aberrant forms do not have fertile asci I cannot place them elsewhere. Varying in color from a clear saddle brown to black-brown. Much infested by a parasitic fungus which causes black, morbid, apothecia-like growths.

3. *Lecidea plana* Lahm.—Identification doubtful, but agrees in all essentials.

4. *Gyrophora rugifera* (Nyl.) Th. Fr.—Abundant on the south side of ledges at 10,800 ft. and for several hundred feet below; not found on the north side of the mountain. Growth luxuriant, but very rarely fertile.

5. *Gyrophora reticulata* (Schaer.) Th. Fr.—Excessively abundant from 8000 ft. upward. Occurring in all kinds of situations and forming the dominant lichen. Rather variable, but all forms may be referred to this species, whether typically foliose or reduced to a dense, uniform, crustaceous rock covering. According to the investigations of Dr. R. Heber Howe, who has recently examined the lichen types of the Linnaean Herbarium, *Lichen deustus* of Linnaeus is really *G. reticulata*, which therefore becomes a synonym of *G. deustus* (Lin.) R. H. Howe.

6. *Acarospora chlorophana* (Wahlb.) Mass.

7. *Acarospora cervina* (Pers.) Koerber.

8. **Acarospora thermophila** Herre, n. sp.—Thallus somewhat orbiculate to effuse, areolate and fissured, of small lobulate squamules which are more or less stalked or stipitate beneath, the clustered stalks often branched, their height reaching 7 mm. Surface of squamules imbricate-lobate, the lobes very small, except marginally where they may be slightly expanded. Upper surface a pale yellow-brown or clay-brown; beneath black. No reactions visible.

Apothecia rare, small to medium, solitary or several grouped together, their surface more or less roughened and wrinkled, or sometimes fissured; an evident narrow thalline margin present; epithecium yellow-brown; hypothecium yellowish or very pale brownish; thecium colorless, turning to very deep blue with I; paraphyses simple, not septate, subcoherent, slender, their tips not enlarged; asci broadly clavate or top-shaped, measuring 24.8–

30.5 μ in breadth by 61–68 μ in length; spores colorless, exceedingly numerous, short ellipsoid to subglobose, 1–2 μ broad by 2–4.5 μ long.

Common on rocks everywhere in the desert about Reno, Nev., at an altitude of 4700 to 6000 ft.; not rare on Mt. Rose at 8000 ft. and above, and abundant in the Sierras along the Truckee River near the Nevada-California state line at an altitude of 6000 ft.

In a preceding paper (Bot. Gaz. **51**:286–297. 1911) this plant was mistakenly called by me *Acarospora thamnina*. It is certainly the most successful xerophyte of the Nevada desert, growing in the driest places, where it is exposed to the most intense light and heat. The apothecia are rarely developed, but the scales are commonly covered with a parasitic fungus so that they appear fertile, but their true condition is readily shown by careful sectioning.

9. **Acarospora thamnina** (Tuck.) Herre.—*Leconora thamnina* Tuck., Genera Lichenum, 120. 1872; *L. cervina* b. *thamnina* Tuck., Synopsis **1**:202. 1882.—Thallus of small, dense irregular clumps 8–15 or rarely 25 mm. or more in diameter, with domelike or irregularly rounded surface, or more or less flattened. On closer examination the surface is seen to be made up of a great number of small to minute, closely appressed, and highly irregular, plicate, or even imbricate, lobulate squamules; these are continued downward into stems which coalesce to form finally flattened, rootlike stipes, the whole clump with its basal stipe reaching a height of 10–15 mm. in well grown specimens. Color various shades of brown; often gray or bluish-gray pruinose; usually more or less blackened by a parasitic fungus; the under surface dead black. No reactions observable.

Apothecia rare, small or minute, 0.2–0.8 mm. in diameter, rarely more than one in squamule, immersed, their surface more or less roughened or gyrose; thalline margin entire, rather thick; much darker in color than the thallus; epithecium yellow; hypothecium pale; paraphyses simple, straight, their tips not enlarged, oleoguttate, 1–2.7 μ broad; asci cylindrical, 13–18 μ broad by 48–55 μ long; when treated with I the colorless thecium is first blue, then wine-red, and finally tawny; spores short ellipsoid to ellipsoid, 0.75–1.25 μ broad by 3.3–4.5 μ long.

A rare plant, known only from the cold high Sierras. Collected by BOLANDER at Mono Pass in 1867, and so far as I know not reported authentically by others. Occurring on earth deep in the crevices of rocks beside the observatory on the summit of Mt. Rose, associated with *Gyrophora rugifera*. For the determination of this singular *Acarospora* I am indebted to Dr. W. G. FARLOW, who kindly compared my material with that in the Tuckerman Herbarium.

10. *Lecanora rubina* (Vill.) Ach.

11. *Lecanora melanophthalma* (DC.) Jatta.

12. *Candelariella cerinella* (Flk.) A. Zahlbr.—On rocks at 10,800 ft. and also on the thallus of other lichens.

13. *Blastenia ferruginea* (Huds.) Arn.—On the thallus of other lichens and also on rocks at 10,800 ft.

14. *Caloplaca elegans* (Link) Th. Fr.—Common at all elevations from 8000 ft. to the summit.

15. *Caloplaca murorum* (Hoffm.) Th. Fr.—Not very abundant at 8000 ft.

16. *Xanthoria lychnea laciniosa* (Schaer.).—On the thallus of *Gyrophora rugifera* and in crevices of rocks at 10,800 ft.; not very plentiful.

17. *Physcia tribacia* (Ach.) Tuck.—A few small, sterile specimens were collected at 8000 ft. and at 10,800 ft.

EVERSON, WASH.